



FROM THE DIRECTOR



Once in a Generation

One of the nation's biggest transitions — and NASA's — is the long-anticipated addition of the next-generation James Webb Space Telescope to our array of space-based observatories. A flawless JWST Christmas Day launch has been followed by a number of complex and successful steps as the telescope arranged itself into its final configuration.

Now that the JWST has settled into its target orbit nearly a million miles from Earth, the telescope will begin to study an array of astronomical phenomena, both in our own solar system and well beyond, to the furthest reaches of the observable universe. If history is any guide, there will be surprises and excellent images to accompany them.

In an upcoming Horizons issue, we'll be taking a look at the testing behind the JWST: the painstaking processes that ensured that this once-in-a-generation instrument and its various systems were prepared to withstand and excel in the extreme conditions the telescope now experiences.

New on the Site

[Our website](#) continues to evolve as we add content. [Our first video](#), an overview look at SETMO's technical capabilities and the facilities we support, is posted there. We'll also be including information on additional SETMO-sustained facilities, as well as a data compendium that provides a deeper dive into each facility's unique characteristics.

As always, don't hesitate to reach out to us at hq-setmo@mail.nasa.gov with any comments or feedback. Hope you enjoy this latest Horizons issue.

Michael Mastaler



NEW AND NOTABLE

A recent article by Armstrong Test Facility Director Gen. David Stringer has been posted on the SETMO website. Entitled "[Why Test Spacecraft and Delivery Systems?](#)", the piece summarizes testing's many benefits, not solely for missions, but also to ensure workforce competencies and continuity, as well as facilities sustainment and improvements.

In December, NASA Langley personnel demonstrated the [Test and Evaluation Simulator \(TES\)](#) configured for lunar lander simulations to astronauts Victor Glover and Drew Feustel from NASA's Astronaut Crew Office. The pair flew combinations of approach trajectories, control laws, variations in control power, heads-down display elements, and enhanced vision elements. The TES is a stand-up, rapid-prototyping simulator being used by the [Human Landing System Program](#) for crew interface design and assessments of handling qualities.

The [Lucy spacecraft](#) continues its journey toward the asteroid belt and the grouping known as Trojan asteroids, captured within the planet Jupiter's orbit. Launched this past October, with Lucy's systems verified during NASA-supported testing, Lucy's mission is slated to last 12 years and will focus on some of the oldest rocky bodies known to exist within the solar system. Although [Lucy's solar array didn't latch](#) after deployment — an issue the mission team is working to resolve — all spacecraft systems are normal. The arrays are producing ample energy, charging the spacecraft's battery as expected.

With its launch in late November, the [Double Asteroid Redirection Test](#) spacecraft — DART for short — remains on target this coming autumn to hit head on Dimorphos, a small moonlit asteroid. Part of a binary asteroid system that orbits the Sun between 7 and 11 million miles from Earth, Dimorphos was chosen to demonstrate [kinetic impactor technology](#). Such a capability could mitigate or eliminate a serious potential terrestrial asteroid-impact threat should one ever be detected. The DART spacecraft's NEXT-C ion thruster engine underwent acceptance testing in NASA Glenn's VF-6 chamber.

A colorful autumn has given way to winter's darker hues. It's a time of transition, as temperatures have plunged and the winds feel more raw than renewing. Hopefully, despite the ongoing Covid pandemic challenges, you were able to spend some quality holiday time with your family and friends. Thankfully, 2021 is over, and better times beckon for 2022.

We at SETMO have our own transitions as well: in particular, three on our team have retired from NASA and have moved on to the next phase of their lives. We're profiling them — Bob Kowalski, Mike Montz and Jean Roberts — in this issue of Horizons, and learning where they've been and where they're now planning to go.

All three have contributed enormously to our work. I am grateful for their deep expertise and fortunate to have counted them as colleagues. They will be missed, and I know our entire team wishes them the very best.





Robert Kowalski

As a child, Bob Kowalski had stars in his eyes – more accurately, space. His heart was set on becoming a member of NASA's astronaut corps, but he would have to wait until adulthood to even begin the process. Then came the applying, and the filling out of applications. And more applications ...

"I applied at least a half-dozen times starting in the late 1980s," Bob says. "I flew on the Vomit Comet. I got my pilot's license. I figured all of that would help. But ... I just didn't have what it took, I guess, at least not then.

He may not have rocketed directly to the high frontier, but Bob's work has been essential in helping others do just that. Bob began his career at Johnson Space Center in Houston, Texas where he would spend a little over a

decade performing propulsion systems testing and becoming the subsystem manager for the Shuttle Reaction Control System.

Bob later moved to the Johnson Space Center's White Sands Test Facility (WSTF), in Las Cruces, New Mexico, where he would remain for a quarter century testing and evaluating potentially hazardous materials, space flight components, and rocket propulsion systems. Because of its remote location and unique capabilities, White Sands can safely conduct studies that otherwise may pose some danger to more densely populated areas.

Bob grew up near Chicago, and his wife in New Mexico and West Texas. When Bob's parents "got tired of shoveling snow" they moved to Phoenix, Arizona, and Bob moved to Tucson to attend the University of Arizona. A co-op opportunity led to the career at NASA.

Prior to becoming chief of the White Sands Propulsion Test Office in 2012, Bob was acting chief of the Technical Services Office, responsible for WSTF's enabling capabilities, which support all WSTF's test programs. An opportunity would arise at NASA Glenn's Plum Brook location – now the Armstrong Test Facility (ATF) – and one that Bob and his wife (also a NASA engineer) couldn't pass up.

"We wanted to do something different," he says. "So when this opportunity came up, I said to my wife, 'Let's go do it!'"

In all, Bob worked for NASA for over 40 years in various engineering and management

positions. He concluded his Agency career as manager of the ATF Space Environments Complex. There, he and his team of civil servants and support contractor staff managed and operated four space-dedicated testing laboratories that assess stresses during liftoff, flight and extended missions from vibration and sound, electromagnetic radiation, and the general impacts of continued exposure to a hard vacuum.

No longer concentrating on space travel, Bob's focus now is more down to Earth. He will be focusing on his primary passion: travel. Two other priorities, volunteering and camping, are also on the list. It's time, he says, to do other things, things much more terrestrial.

"Working for NASA has been an amazing thing. The work has been fascinating," he says. "I've been hands-on with the shuttle, with the space station, with Orion, with rockets. And the people: so intelligent, in a class by themselves.

Bob's wife is planning to open a personal catering business. Bob may be drafted as an apprentice sous-chef. A second career could be in the offing.

"I'm still a little anxious about leaving. It's going to be different," Bob says. "But I've had experiences few people have – research in space exploration and space travel. Those things I've played some small role in. It's been pretty great.



Michael Montz

Few who are employed by NASA can attest to being a working model, but Mike Montz has been one. Though "model" in this case doesn't refer to a person appearing in an extended magazine photoshoot, but as a literal test article in a chamber. Specifically, for Mike, that

meant suiting up in a NASA EMU – short for Extravehicular Mobility Unit – one of two types of spacesuits currently worn by astronauts on the International Space Station during spacewalks.

"I became certified as a suit test subject and have worn the EMU during numerous chamber tests," he says. "We find, during testing, issues we're able to address and correct. That's been very satisfying to me, especially working with the mission crews.

Mike left the modeling and testing part of his life behind once he retired from NASA at the end of December. Owner of a small ranch near Alvin, Texas, he plans to spend most of his time there, except when he and his wife are traveling, something Mike says "we haven't done in all these years.

It's been a journey that, education-wise, began for Mike in a small elementary school where each teacher provided instruction to three grades in a single room. His class numbered just three students. The high school count was a little larger: 36 classmates in all.

Once graduated from the University of Nebraska, Mike began to work for Boeing in Wichita, Kansas. Making plans for a Thanks giving reunion with his family, Mike gave a lift home to one of his grade-school classmates, who likewise was working in Wichita. The result was that "Juanita and I have been together since that time. We were married in June 1980, 12 days before I started at Johnson Space Center and just a little over 41 years ago.

A NASA application and a call from Johnson Space Center (JSC) later, Mike would begin his career as a test director in small thermal vacuum chambers, part of a complex that still includes JSC storied Chambers A and B. Long before Mike's work began, those chambers hosted both the Apollo Command and Service and Lunar Excursion Modules for tests, and were "man-rated," certified for testing space suits as crew members wore and moved around in them.

Involvement with space shuttle testing would follow, as would testing of the aforementioned EMU and tools and hardware used during

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spacewalks. In all, Mike would be the primary test director for 105 manned tests, and assistant test director for 65.

Even back in college days, I was interested in testing, he says. "There's the challenge of putting equipment in a chamber so that crew can work with it. It was always interesting to see how the hardware components came

together and interacted. There was something new all the time.

Mike would ultimately be promoted to deputy branch chief – and, by 2019, branch chief – for the JSC Systems Test Branch, where he would oversee Chamber A testing of the James Webb Telescope. A lot of very talented people worked to make the JWST test successful, he

says. "I was glad to have played some small part in that once-in-a-life-time project.

Of his involvement with SETMO, Mike says he was especially grateful to have had the opportunity to see first-hand other test facilities across NASA. Now, though, it is time for the next chapter. "Forty years [working] is sufficient, he says. "It's been a very satisfying life.



Jean Roberts

Gardening, it is said, is good for the soul. For Jean Roberts, now retired from her post as the Armstrong Test Facility's (ATF) business manager, it is a particular devotion, one Jean says she's eager to fully indulge. "I'm ready to get going on my hobbies – gardening especially. My mom had a big flower garden and I learned a lot from her. And I have a vegetable garden too.

Jean got her start in the early 1980s working for a U.S. Department of Energy program that leased space from NASA at what was then called Plum Brook Station (now ATF). As a security specialist, Jean managed classified documents and classified equipment, includ

ing faxes and telephones, and assisted in processing security clearances.

By October 1986, Jean had become a NASA civil servant serving as an administrative aide to the chief of the Plum Brook Management Office. Off the bat, things didn't go as smoothly as Jean would have liked. "When I first started, in my first two weeks, we were typing up charts on why we shouldn't close Plum Brook down, she recalls. "I asked myself: what have I stepped into? But Plum Brook's uniqueness and value persuaded the Agency otherwise.

By September 1990 Jean had been promoted to a contract specialist with a small purchase warrant authority, placing all NASA orders under \$25,000 for Plum Brook Station; she also assumed the role of contracting officer technical representative for the Station's prime contract. By October 2008, Jean took on the role of financial management specialist, managing all Plum Brook funds while maintaining her previously assigned contracting-officer duties.

"It was a roller coaster ride for the test facilities over my career at Plum Brook, she says. "I've seen the facilities not having any testing customers to then seeing all four of the major ones come out of standby and be active. Each time Plum Brook seemed to come back stronger than ever.

Certainly for the general public, the Station was a big draw. During the times Plum Brook organized open houses, attendance was ro

bust, drawing many from nearby communities to witness for themselves the progress made by NASA's projects and programs.

"Whenever we had the open houses, the public was so enthused about our facility, Jean says. "It was pretty neat for everyone to see what we were actually doing.

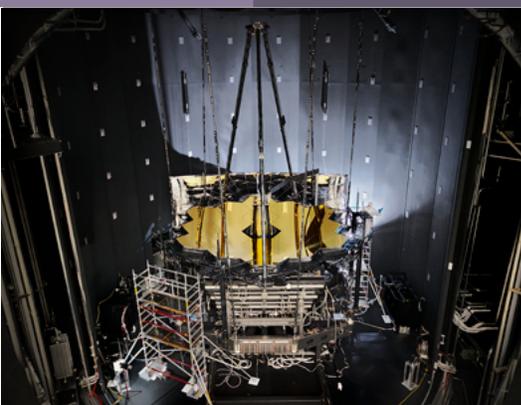
Jean credits SETMO's predecessor, the Shared Capability Asset Program, or SCAP, for smoothing the budget ride, ensuring that funds were available to sustain, maintain and improve essential testing competencies. Among other issues, there was a sizable list of deferred Station maintenance items that needed to be addressed.

"You have to have a budget to maintain your facilities, to keep them open and working, Jean says. "We didn't have that until SCAP. Once funding was stabilized, that was when Plum Brook started pulling in customers.

Jean and her husband still live in a small town about seven miles from the Armstrong Test Facility. Two adult children live close by in that same town. In addition to tending to her flower and vegetable gardens, she is a dedicated card player, an enthusiastic traveler, and always on the hunt for treasures at flea markets.

"It's time for me to leave. I have no regrets, Jean says. "I've loved to see how Plum Brook, now Armstrong, has grown. I hope they will continue to get work and commitments from big programs. But I will definitely miss the people.

IN FOCUS Testing Preps JWST Success



The most complex – and powerful – in-space observatory ever created, [the James Webb Space Telescope \(JWST\)](#) is beginning to assume its final configuration. Following Webb's arrival at its orbital destination around Lagrange Point 2 on January 24, the mission operations team began working its way through a critical series of steps: powering on all the science instruments, turning off heaters to begin a long cooldown process, and ultimately capturing the first photons on the JWST primary camera to enable a months-long alignment of the telescope.

Such progress would not have been possible without extensive terrestrial testing of all Webb systems and components prior to the telescope's launch and deployment.

One example: when the vault-like, 40-foot diameter, 40-ton door of NASA's Johnson Space Center's Chamber A was sealed shut on July 10, 2017, it signaled [the beginning of about 100 days](#) of cryogenic testing for Webb.

Before Webb was placed inside, Johnson engineers built a large cleanroom around the Chamber A entrance. The cleanroom enabled

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the telescope to be hoisted from its shipping container and unwrapped from protective bagging, deployed, rotated from horizontal to vertical, placed on its test platform and, finally, slid into the chamber on rails and hung from the six long suspending rods.

The observatory's optical telescope and integrated science instrument module – known as OTIS – were put through a series of tests designed to ensure the telescope functioned

as expected in an extremely cold, airless environment akin to that of space.

While Webb was inside the chamber, insulated from both outside visible and infrared light, engineers monitored it using thermal sensors and specialized camera systems. The thermal sensors kept tabs on the temperature of the telescope, while the camera systems tracked the physical position of Webb to see how its components moved

during the cooldown process.

Other types of testing would also occur, a necessary prelude to prep the observatory for long and robust operation. An upcoming Horizons article will examine those assessments, and do a deeper dive into exactly how central testing has been to the JWST journey in its quest to peer deeply into the vast expanse of the observable universe.

WHAT'S NEXT



A Dress Rehearsal for Artemis 1

Work continues inside the Vehicle Assembly Building (VAB) at NASA's Kennedy Space Center in Florida in preparation for an Artemis I launch pad wet [dress-rehearsal test](#), currently targeted for sometime in March. Teams have been installing the rocket's flight termination system and are working on the first of a two-part test of the system. Once the rocket and spacecraft systems are verified during the dress rehearsal, the 322-foot-tall rocket will roll back into the VAB for final inspections and checkouts, before returning [to the pad for launch](#).



First JWST Images Anticipated this Summer

Mirror alignment for the [James Webb Space Telescope](#) continues, a process that thus far has led to completion of three of seven planned phases. When all seven are finished, Webb's optics team will ensure that the observatory's 18 primary mirror segments have formed a single mirror surface. The fully aligned telescope will then be ready for instrument commissioning. The first scientific images are expected to be delivered to the world in the summer. Additional work continues in tandem to prepare the observatory for full operation using all four of its instruments. One essential Webb instrument, the [Near Infrared Camera](#), continues to approach its target temperature of approximately -244 degrees Fahrenheit (-153 degrees Celsius).



Ground Testing Begins for the X-59

NASA's X-59 Quiet SuperSonic Technology aircraft (QueSST) has been moved from manufacturer Lockheed Martin's Skunk Works in California to the company's facilities in Texas to prepare for [ground testing](#), as progress continues toward the aircraft's expected first flight later this year. The Texas studies are to ensure the aircraft can withstand the loads and stresses that typically occur during flight. The team will also calibrate and evaluate fuel systems before the X-59 makes the journey back to California for additional tests and completion. A key X-59 component is a [synthetic vision system](#), extensively vetted and validated in NASA simulators.

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